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Reference No. 50-45

OCEANIC BIOLOGY
(Oceanographic Research)

C. J. Fish, SUPERVISOR

July 1, 1950 - September 30, 1950

WOODS HOLE, MASSACHUSETTS

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Periodic Status Report
Office of Naval Research
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APPROVED FOR DISTRIBUTION

Director

ABSTRACT

Laboratory recordings and measurements of sounds produced by marine fishes of the Narragansett Bay Region have been continued. Difficulties previously experienced in inducing sonic response in some forms have been largely eliminated by the use of a newly devised electrical stimulator. During the past three months twenty-two different members of the summer population were subjected to the 'stimulator' test. Field observations on the toadfish (Opsanus tau) reveal that the sound during the pre-mating period is quite different from that produced at other seasons. Weekly plankton collections and records from weather stations BAKER and EASY now total 54. Five graduate student assistants completed course requirements in August. During the past three months 5175 additional titles have been entered in the Bibliographic Card Index of Atlantic and Pacific Oceanography.

Subj: The Oceanic Biology Project

RESEARCH

1. Sonic Fish program. Intensive field observations on the toadfish (Opsanus tau), outlined in the previous report (Reference No. 50-28), were continued during the present quarter. More conclusive evidence that the "foghorn blast" is associated only with the pre-mating period was gained by the gradual falling off of this characteristic sound as the spawning and incubation periods advanced. Whereas between 22 June and 13 July an almost constant medley had been recorded, by 28 July there was only an occasional blast, confined to deeper water, and by 7 August none were apparent anywhere. Although toadfish were plentiful thereafter, all specimens examined were spent. Nests guarded by parent fish were repeatedly observed throughout the incubation period, but no evidence that the "foghorn blast" is used again was found.

2. The need for a simple method to induce sound-making in fishes resulted in the development of an electrical stimulator. Although noises thus artificially induced may not in all instances be the normal "voice" of an individual, the capability of sound production is immediately indicated. This permits rapid examination of all specimens, elimination of negative species without long experimentation, and earmarking of positive noisemakers for further testing under natural conditions. A loudspeaker attachment makes possible better correlation of the sounds produced with the performance of the fish, and all experiments have been recorded on Presto discs. The following species have been studied in the stimulator: squeteague (Cynoscion regalis), scup (Stenotomus chrysops), toadfish (Opsanus tau), common and red-winged searobins (Prionotus carolinus and P. evolans), kingfish (Menticirrhus saxatilis), silver hake (Merluccius bilinearis), puffer (Spheroides maculatus), burrfish (Chilomycterus schoepfii), crevalle (Caranx crysos), sea bass (Centropristis striatus), shark sucker (Echeneis naucrates), tautog (Tautoga onitis), cunner (Tautogolabrus adspersus), sand flounder (Lophopsetta maculata), hog choker (Achirus fasciatus), eel (Anguilla rostrata), butterfish (Poronotus triacanthus), triggerfish (Balistes carolinensis), banded rudderfish (Seriola zonata), striped bass (Roccus lineatus), and blueback (Pomolobus aestivalis). Marie P. Fish is in charge of this program, assisted by Alton S. Kelsey, Jr., John A. Kelly, Jr., and Marilyn P. Fish.

3. On 1 August preliminary work was instituted at the Narragansett Laboratory on a problem of underwater sound scattering. This is an independent new Office of Naval Research Project (1 July 1950) of the Brown University Physics Department which will be carried out in cooperation with the Narragansett Marine Laboratory. In return for Mrs. Fish's service as biological consultant, the vessel and marine laboratory facilities afforded by the Narragansett Laboratory, Brown University will continue to make available Mr. Kelsey's services as consulting physicist in the Sonic Fish Project. Available species of local fishes were studied for significant differences of size, shape, surface texture, and internal structure (e.g., presence or absence of air bladder). Pending completion of experimental apparatus, collection and preservation of representative specimens in normal swimming position has been carried on. This material will later be used in comparative tests with living forms.

4. Weathership Plankton program. The field work at Stations EASY (35°00'N 48°00'W) and BAKER (56°30'N 51°00'W) has continued without interruption and with surprisingly little apparatus loss or damage. During the first eight months of operation, but one silk net has been lost and three instances of apparatus damage reported. When the latter occurs the instrument case is recalled for inspection and repair of contents and a reserve case substituted. Since the expected life of a silk plankton net in continuous use rarely exceeds six to nine months, arrangements are being made to provide replacements for all. These will be issued as needed.

5. At Station EASY a set of three weekly collections and records was made by each of the following vessels during the quarter ending September 30, 1950:

USCGC DUANE	July 12 - August 2
USCGC CASCO	August 2 - August 23
USCGC BARATARIA	August 23 - September 13

At Station BAKER similar collections and records were obtained by the following vessels:

USCGC YAKUTAT	July 1 - July 22
USCGC COOS BAY	July 22 - August 12
USCGC SPENCER	August 12 - September 2

To date there have been 18 cruises and a total of 54 weekly plankton stations completed. Nansen Bottle samples from the two stations are being assigned to Gordon Riley for phytoplankton study. Analysis of the zooplankton and oceanographic data from Stations EASY and BAKER is being carried out by Charles J. Fish, assisted by William V. Kielhorn.

TRAINING

7. Five graduate student assistants in biological oceanography spent the summer at the Narragansett Marine Laboratory assembling thesis material. They also completed course requirements in August. These included two special summer courses arranged to provide instruction in field methods comprising organization and planning of vessel work, operation of gear at sea, recording of data, preservation of materials and preliminary field-laboratory analysis of results.

8. One of the student assistants, having previously obtained a Master's Degree at Brown University, is now engaged in thesis work for his Doctorate at the same institution. The others are candidates for the Degree of Master of Science at Rhode Island State College and expect to complete requirements for the degree in June 1951. Each of the thesis problems is concerned with a different aspect of oceanic ecology. Those selected to date include open ocean zooplankton, neritic zooplankton, marine bacteria in association with plankton, benthonic invertebrates and a population of vertebrate plankton feeders (herring). Two of the students will do their thesis research at the Woods Hole Oceanographic Institution, two at the Narragansett Marine Laboratory, and one at the Bingham Oceanographic Laboratory at Yale.

BIBLIOGRAPHIC CARD INDEX

9. The Atlantic and Arctic and Pacific Bibliographies are now separate units. During the past quarter, Mary Curtis Cobb, working at Woods Hole, has indexed approximately 3600 titles for the Atlantic Bibliography, 900 for the Arctic, and 675 new Pacific title references. All three indexes are being maintained up to date.

PERSONNEL

10. Name	Title	Total Man Days*
Charles J. Fish	Senior Biologist, in charge (quarter time)	15.7
Marie P. Fish	Associate Biologist	88.0
Mary C. Cobb	Secretary-Technician	88.0
Marilyn P. Fish	Temporary assistant	31.5
	Graduate student assistants (5)	135.8
	Total Man Days	359.0

*Man day consists of 8 working hours.

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